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CENTRAL FAX CENTER****APR 10 2007****REMARKS**

The Office Action has rejected Claims 1, 2, 5-7, and 9. The Examiner is thanked for identifying Claims 3 and 10 as directed to allowable subject matter.

Claims 1-3, 5-7, 9 and 10 were rejected under 35 U.S.C. §112, second paragraph as allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, and specifically, for an alleged lack of consistency between Claims 1 and 3. The Examiner avers that it is unclear how a preexisting buffer volume has circulating flow.

Claims 1, 2, 5-7 and 9 were rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 5,966,942 to Mitchell (hereinafter "Mitchell") in view of U.S. Patent No. 6,256,998 to Gao (hereinafter "Gao").

The Examiner has acknowledged that Mitchell does not disclose using a multiple stage pulse tube and valves to control the phasing of the working gas but has taken the position that Gao shows these features to be old in the pulse tube art. The Examiner states it would have been obvious to modify Mitchell by using a two stage pulse tube in order to achieve a lower temperature and to use valves to control the phasing to achieve the lower temperature efficiently and controllably.

Applicant respectfully traverses these rejections.

Applicants submit that there is consistency between claims 1 and 3. At paragraph [0025] of the specification, it states that the volume of the cooling channel 114 may be sufficient to serve as the buffer volume. Additionally, Figures 1-4 of the present invention clearly show an inlet and an outlet in the buffer volume so that gas can flow through it. However, to advance

prosecution of the present application, for clarification Applicant's have Amended claim 3 as an independent claim.

Withdrawal of this rejection is respectfully sought.

Turning to the 35 U.S.C. § 103 rejection over the combination of Mitchell and Gao, Applicants respectfully traverse this rejection.

Mitchell describes the use of fluidic diodes to replace the conventional orifices that are typically used to control the flow into and out of the buffer volume. The fluidic diodes may be vortex tubes that can be helpful in rejecting heat. Gas flows in and out of the buffer volume and most, but not all, of the gas circulates through separate tubes between the warm end of the pulse tube and the buffer volume. Additionally, in Mitchell, unlike the present invention, the gas does not all flow through the vortex diodes in only one direction. As stated at column 8, lines 32-34 of Mitchell, the diodes "resist flow through it" but do not block flow in the reverse direction. Inasmuch as portion of it flows back whereas in the present invention circulation of all the gas is in one direction, through the buffer volume, claim 1 of the present invention cannot be rendered obvious by the Mitchell reference.

The Examiner states that at column 8, lines 39-41 Mitchell teaches a rectifying circuit. Lines 39-41 of Mitchell state "Heat is removed from the exterior wall of the vortex chamber 172 by known means such as a water jacket (not shown)." Therefore, Mitchell actually teaches away from the present invention in that the cooling means must be "a known means".

The object of the present invention is an **improved** means of removing heat from the hot end of a pulse tube refrigerator when it is remote from the warm end of the regenerator. Clearly, the means used in the present invention is not a known means such as a water jacket, and also

represents an improved means. The rectification circuit with cooling means of the present invention differs from the Mitchell reference.

One skilled in the art would not have looked to Gao for a solution to the present problem, i.e., an improved means of removing heat from the hot end of a pulse tube refrigerator when it is remote from the warm end of the regenerator. In the previous Office Action dated October 10, 2006 the Examiner stated, "Gao discloses.....with the exception of cooling the gas entering the buffer volume."


Nothing in the references alone or together suggests the solution to the present problem. Moreover, the combination of Mitchell and Gao does not make the present invention obvious. Nor has the Examiner cited an appropriate motivation to combine these references to arrive at the present invention. Here, the Examiner has relied on hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as a "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. *See In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) (stating "one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention").

For the foregoing reasons, Applicant submits that the present invention overcomes all the rejections in the Final Office Action and the claimed subject matter is patentable. A Notice of Allowance is respectfully requested.

In the event of any outstanding matters which might be settled by telephone, the Examiner is requested to contact the undersigned Applicants' authorized representative.

Any fee due with this paper, not fully covered by an enclosed check, may be charged on
Deposit Account 50-1290.

Respectfully submitted,


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